

In the Specification

[0010] In one embodiment, the wash pipe comprises a body that includes a plurality of composite layers and a substantially impermeable layer lining an inner surface of the innermost composite layer forming a pressure chamber. In this embodiment, an energy conductor is integrally positioned within the body. The sensor may be directly or inductively coupled to the energy conductor which may take the form of an optical fiber that provides for communication between the sensor and other downhole devices such as a downhole processor or the surface. The sensor may measure properties of the treatment fluid such as viscosity, temperature, pressure, velocity, specific gravity, conductivity, fluid composition and the like. In one embodiment, a series of sensors may be embedded within the body of the wash pipe at predetermined intervals such that the treatment fluid properties may be monitored as a function of position along the length of the interval. Based upon the data collected by the sensors, various characteristics of the treatment fluid may be regulated such as fluid viscosity, proppant concentration, flow rate and the like. In one embodiment, the apparatus may further comprise a downhole mixer which provides a mixing area wherein components constituent parts of the treatment fluid such as the carrier fluid and the solids are combined to form the fluid slurry downhole which reduces

the delay in the downhole effect of the real time regulation of treatment fluid characteristics.

[0054] Referring now to figure 12, an apparatus 260 for monitoring fluid properties within a production interval 262 is depicted. A wellbore 264 includes casing 266 which is cemented therewith. A work string 268 extends through casing 266 and into production interval 262. An outer tubular 270 is positioned within work string 268 and a packer assembly 272 provides a seal therebetween. An inner tubular 274 is positioned within outer tubular 270. In operation, tubular 270 provides carrier fluid and a tubular 274 provides sand, gravel or proppants into a downhole mixer which provides a mixing area 276 wherein the carrier fluid and the solids mix to form fluid slurry 278. Fluid slurry 278, in turn, is delivered to production interval 262 via a cross-over assembly 280 as indicated by arrows 282.